

SINGLE SUPPORT LEVER KEYBOARD MECHANISM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The described embodiments relate generally to peripheral devices for use with computing devices and similar information processing devices. More particularly, the present embodiments relate a thin profile, aesthetically pleasing keyboard well suited for use with computing devices, and methods of assembling such thin profile, aesthetically pleasing keyboards.

[0003] 2. Description of the Related Art

[0004] The outward appearance, as well as functionality, of a computing device and its peripheral devices is important to a user of the computing device. In particular, the outward appearance of a computing device and peripheral devices, including their design and heft, is important, as the outward appearance contributes to the overall impression that the user has of the computing device. One design challenge associated with these devices, especially with portable computing devices, generally arises from a number of conflicting design goals, including the desirability of making the device attractive, smaller, lighter, and thinner while maintaining user functionality.

[0005] Therefore, it would be beneficial to provide a keyboard for a portable computing device that is aesthetically pleasing, yet still provides the stability for each key that users desire. It would also be beneficial to provide methods for manufacturing the keyboard having an especially aesthetic design as well as functionality for the portable computing device.

SUMMARY OF THE DESCRIBED EMBODIMENTS

[0006] This paper describes various embodiments that relate to systems, methods, and apparatus for providing a trapdoor keyboard mechanism for a low-travel footprint keyboard that allows the use of aesthetically pleasing key caps and also provides key stability for use in computing applications.

[0007] According to one embodiment, a thin profile keyboard for a computing device is described. The keyboard includes a plurality of keys arranged in a plurality of rows. Each row includes a plurality of keys and the keys in a first row are offset from the keys in a second row. Each key includes a key cap and an actuator attached to a base plate. The actuator is configured to deform to activate electrical switch circuitry when it is deformed. A portion of a rigid support lever is positioned over the actuator, which can be a metal dome. The support lever has one end that is attached to a bottom surface of the key cap and a second end that is attached to a substrate at a pivot point. When a force is applied to the top surface of the key cap, the force causes the support lever to rotate about the pivot point, causing a bottom surface of the support lever to contact and deform the actuator. In an embodiment, the key cap can be in the form of a flat slab. An elastomeric spacer may be provided on the support lever over the metal dome such that the elastomeric spacer deforms the metal dome when the key is depressed by a user. The use of a single support lever allows the key cap to be simply adhered to the support lever and the support lever also reduces instability when the key is depressed by a user. As the key cap can

be adhered to the support lever, intricate attachment features on the underside of the key cap are unnecessary, thereby allowing the key cap to be formed of a variety of materials, including glass and metal.

[0008] A method of assembling at least a portion of a low-travel keyboard for a computing device is disclosed. The method can be carried out by the following operations: providing a metal dome configured to deform when depressed from above, disposing a support lever over the metal dome, and adhering a key cap to the support lever. The metal dome can activate electrical switch circuitry of the keyboard when the metal dome is deformed. The support lever is coupled with a substrate at a point on a first end of the support lever. The bottom of the key cap is adhered to a top surface of the second end of the support lever, which is positioned over the metal dome to deform the dome when depressed from above. In an embodiment, the support lever is formed of a rigid material and is pivotally coupled to the substrate such that the support lever deforms the metal dome when the support lever is depressed from above, as the support lever rotates slightly about the pivot point where it is coupled to the substrate. In another embodiment, the support lever is formed of a flexible material and fixedly coupled to the substrate on one end.

[0009] Other aspects and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

[0011] FIG. 1 is a side view of a typical key switch of a scissor-switch keyboard.

[0012] FIG. 2 is a side view of an embodiment of a key having a single support lever.

[0013] FIG. 3 is a detailed view of an embodiment of the pivoted attachment of the support lever to the topcase.

[0014] FIG. 4 is a simplified top perspective view of a key cap 210 positioned in an embodiment of the topcase.

[0015] FIG. 5 is a bottom plan view of an embodiment of a keyboard arrangement.

[0016] FIG. 6 is a detailed perspective view of the bottom of the keyboard arrangement shown in FIG. 5.

[0017] FIG. 7 is a detailed perspective view of an embodiment of a three-layer membrane of a printed circuit board.

[0018] FIG. 8 is a flow chart of a method of assembling an embodiment of a key switch having a single support lever.

DETAILED DESCRIPTION OF SELECTED EMBODIMENTS

[0019] Reference will now be made in detail to representative embodiments illustrated in the accompanying drawings. It should be understood that the following descriptions are not intended to limit the embodiments to one preferred embodiment. To the contrary, it is intended to cover alternatives, modifications, and equivalents as may be included within the spirit and scope of the described embodiments as defined by the appended claims.

[0020] The embodiments herein relate to a thin profile peripheral input device that is both efficient and aesthetically pleasing. In particular, the thin profile peripheral input device